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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/435,458	02/15/2000	Anna Malgorzata Celler	80142US	5246

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EXAMINER
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LU, TOM Y

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/435,458

Applicant(s)

CELLER ET AL.

Examiner

Tom Y. Lu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-23 and 25-40 is/are rejected.
- 7) ☒ Claim(s) 9 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)     | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

1. Upon entry of the response and affidavits filed on 7/11/2005, the prior art reference of Celler "An EM-algorithm for dynamic SPECT tomography", March 1997, which applied in the previous office action dated 02/07/2005 is no longer applicable. Nonetheless, the claims are now rejected under Limber, "Direct Reconstruction of Functional Parameters for Dynamic SPECT", Nuclear Science Symposium and Medical Imaging Conference, 1994; 1994 IEEE Conference Record Volume 3, 30 Oct.-5 Nov. 1994 Page(s): 1207 - 1211 vol.3.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8, 10-23 and 25-40 are rejected under 35 U.S.C. 102(b) as being anticipated by Limber ("Direct Reconstruction of Functional Parameters for Dynamic SPECT", Nuclear Science Symposium and Medical Imaging Conference, 1994; 1994 IEEE Conference Record Volume 3, 30 Oct.-5 Nov. 1994 Page(s): 1207 - 1211 vol.3).

a. Referring to Claim 1, Limber discloses receiving data representing successive tomography scan images of said object (sequences of images, page 1207, right column, line 29); performing calculation by imposing an inequality constraint (the inequality constraint is demonstrated in figure 1 on page 1210, which the curves are shown in decreasing order, which is one of the inequality constraints shown in the specification page 21, constraint 8a) to determine dynamic data values ( $x_i(t)$  in equation 1 on page

1208 are the claimed dynamic values) from said data (data is the projection image data, pixels, page 1208, left column, line 23), each of said dynamic data values representing a physical property (the physical property is the spatial property) of said object at a respective corresponding one of a plurality of voxels of said object at a respective corresponding time (page 1208, left column, last 5 lines); and producing a representation of said dynamic data values, representing said physical property at said voxels at said times (see figure 3 for simulated heart-like object, which is the claimed “representation”).

b. Referring to Claim 2, Limber discloses wherein performing said calculations includes minimizing a figure of merit function subject to said inequality constraint (equation 4, page 1208).

c. Referring to Claim 3, Limber discloses one of the linear inequality constraint, constraint a, which is as shown in figure 1.

d. Referring to Claim 4, Limber discloses wherein receiving data includes receiving data representing successive images detected at a single photoemission computed tomography image device (page 1208, left column, line 31).

e. Referring to Claim 5, Limber discloses receiving a plurality of sets of values representing measurements of said property across an object at respective measurement times, each set being associated with a respective measurement time (Limber discloses a sequence of images with photon activities across an object of interest at respective measurement times,  $t$ , see equation 1 for all parameters); producing a plurality of sets of values representing said property at a plurality of locations throughout said object at said respective measurement times ( $x_i(t)$ , equation 2), by minimizing a figure of merit

function relating said values representing said measurements with said values representing said property at said plurality of locations (equation 4 on page 1208), with a shape constraint imposed on said values representing said property at said plurality of locations (see figure 1, note the curve in figure 1 is based on a heart-like model).

f. Referring to Claim 6, Limber discloses wherein minimizing said figure of merit function further comprises solving for numerical values describing said property for each of said locations throughout said object, said numerical values being constrained by said shape constraint (see figure 1).

g. Referring to claim 7, Limber disclose wherein minimizing said figure of merit function further comprises solving for linear basis functions describing said property for each of said locations through said object, said linear basis functions being constrained by said shape constraint (see equations 2 and 4, also page 1209, left column, line 26).

h. Referring to Claim 8, Limber discloses wherein minimizing said figure of merit function further comprises minimizing a sum of squares of a difference between a product of a linear operator and said values representing said property, and said values representing said measurements (equations 2 and 4).

i. Referring to Claim 10, Limber discloses wherein minimizing a figure of merit function includes executing a math program on said values representing said measurements, said shape constraint being pre-specified to said math program (the minimizing equations of 2 and 4 are executed as a math program stored in a SPECT machine).

- j. Referring to Claim 11, Limber discloses producing a graphical representation of said object, for controlling a display device (see figure 2, and a SPECT system inherently contains a display device).
- k. Referring to Claim 12, Limber discloses producing a time varying graphical representation of said object to present a change of said property over time (see figure 2).
- l. Referring to Claim 13, Limber discloses transmitting said graphical representation to a display device for displaying a representation of said property (It is inherency of a SPECT system to process the dynamic data and transmit the image to a display device for viewing).
- m. Referring to Claim 14, Limber discloses displaying said representation of said property (see figure 2).
- n. Referring to Claim 15, Limber discloses producing successive images representing said property at successive instants in time, in response to said representation of said property (see figure 2).
- o. Referring to Claim 16, Limber discloses producing said successive images to depict a three dimensional representation of said property in said object which varies according to changes in said property over time (see figure 2).
- p. Referring to Claim 17, Limber discloses producing said sets of values representing measurements of said property across said object at respective measurement times (see figure 2).

- q. Referring to Claim 18, Limber discloses wherein producing comprises measuring radioactivity across said object (see figure 2, the images are representation of photonic activity across said object of interest).
- r. Referring to Claim 19, Limber discloses wherein measuring radioactivity includes operating a Single Photon Emission Computed Tomography (SPECT) imaging device (page 1208, left column, line 31).
- s. Referring to Claim 20, Limber discloses a signal representing said plurality of sets of values representing said property at a plurality of locations through said object (image signal as shown in figure 2).
- t. With regard to Claim 21, see explanation in Claim 5, as noted here again the SPECT machine inherently contains the components of a receiver and a processor circuit to perform the functions disclosed in Claim 5.
- u. With regard to Claim 22, see explanation in Claim 7.
- v. With regard to Claim 23, see explanation in Claim 8.
- w. With regard to Claim 25, see explanation in Claim 11.
- x. With regard to Claim 26, see explanation in Claim 12.
- y. With regard to Claim 27, see explanation in Claim 13.
- z. With regard to Claim 28, see explanation in Claim 13.
- aa. With regard to Claim 29, see explanation in Claim 13.
- bb. With regard to Claim 30, see explanation in Claim 15.
- cc. With regard to Claim 31, see explanation in Claim 16.
- dd. With regard to Claim 32, see explanation in Claim 17.

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- ee. With regard to Claim 33, see explanation in Claim 18.
- ff. With regard to Claim 34, see explanation in Claim 19.
- gg. With regard to Claim 35, see explanation in Claim 19.
- hh. With regard to Claim 36, see explanation in Claim 21.
- ii. With regard to Claim 37, only difference between Claim 5 and Claim 37 is Claim 37 calls for additional limitation of “a computer readable medium for providing computer readable instructions”, Limber teaches the SPECT machine inherently contains a processor to carry out program instruction recorded on a computer readable medium, and the program instruction is in accordance with the steps in Claim 5.
- jj. With regard to Claim 38, see explanation in Claim 37, and Limber’s SPECT machine contains “a computer data signal embodied in a carrier wave”.
- kk. With regard to Claim 39, see explanation in Claim 5.
- ll. With regard to Claim 40, see explanation in Claim 21, and the display is explained in Claim 29.

***Allowable Subject Matter***

- 2. Claims 9 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

- 3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

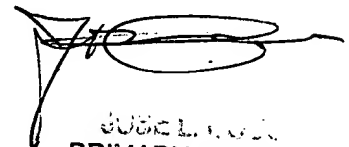


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



TOM Y. LU  
PRIMARY EXAMINER